


## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference BOR 32 PCT	<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	
International application No. PCT/FI2004/000778	International filing date (day/month/year) 17.12.2004	Priority date (day/month/year) 19.12.2003
International Patent Classification (IPC) or national classification and IPC C08F10/06, C08F4/646, C08F2/38		
Applicant BOREALIS TECHNOLOGY OY et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  19.10.2005	Date of completion of this report  24.01.2006	
Name and mailing address of the International preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Kaumann, E  Telephone No. +31 70 340-	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/FI2004/000778

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements**\* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-22 as originally filed

**Claims, Numbers**

1-35 as originally filed

**Drawings, Sheets**

1/1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-35
Inventive step (IS)	Yes: Claims	
	No: Claims	1-35
Industrial applicability (IA)	Yes: Claims	1-35
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1. Subject-matter**

Subject-matter of claim 1 of the present application is a process for producing two different polymer grades having different isotacticity while keeping the melt flow rate constant during the transition.

The process is carried out in at least one reactor in the presence of hydrogen using a Ziegler-Natta catalyst system comprising an external electron donor, which is changed during the transition.

The electron donor is a silicon compound.

Subject-matter of claim 10 is a process for the preparation of at least two propylene polymers having different isotacticity but the same melt flow rate, using a catalyst system comprising a first and a second external donor.

Subject-matter of dependent claim 19 is a process, wherein the catalyst component is prepared according to a liquid-liquid two phase emulsion method comprising: preparing a solution of a group 2 metal (Mg) and an electron donor in an organic liquid, reacting said complex in solution with a transition metal compound to form a dispersion, maintaining droplets of said dispersed phase within an average size of 5 to 200  $\mu\text{m}$  by agitation.

The disperse phase is an oil less dense than the dispersed phase.

The problem to be solved was to provide a process which allows changing the isotacticity of a propylene polymer by changing of the external donor, while keeping the melt flow rate and thus the hydrogen flow constant.

This problem can be solved by using special catalysts, obtained from a liquid-liquid two phase emulsion method, which are self supporting and which show no difference in hydrogen dependent on the used external donor.

**2. Prior Art**

Reference is made to the following documents:

D1: WO 99/20663

D2: WO 95/21203

D3: WO 03/059966

D4: WO 03/000754

D5: WO 03/000757

**D1** discloses a process for forming a high impact propylene copolymer wherein sequentially different external electron donors having a different hydrogen response and a different stereo regulating properties are used. The problem of different hydrogen response and the effect on the melt flow rate is discussed.

**D2** discloses a catalyst system which includes a titanium-supported catalyst in combination with a mixture of tetraethoxysilane (TEOS) and dicyclopentyldimethoxy-silane (DCPMS) as external electron donors. These two external donors lead to different melt flow rates. Therefore, the catalyst system has been found to be effective in making polypropylene and polypropylene copolymers having relatively high melt flow rates and moderately broad molecular weight distribution.

In one embodiment a two step process is disclosed wherein in the first step a propylene polymer is prepared having a melt flow rate of 10 - 1200 dg/min and in the second step a polymer is prepared having a melt flow rate of 1 - 120 dg/min.

Nothing is disclosed about a process for the production of polypropylene having different isotacticity but the same melt flow rate, at a constant hydrogen concentration.

**D3** also relates to a process using different external electron donors, which are added to the polymerization system at different positions. It is disclosed that the different electron donors have a different hydrogen response and that this hydrogen response and the stereo regulating capability of a given electron donor are directly and inversely related. This is in contrast to the teaching of the present invention, wherein specially prepared Ziegler-Natta catalysts are used, which show a different behaviour.

**D4 and D5**, both cited by the application, disclose the preparation of the special Ziegler-Natta catalyst, used in the present invention.

### **3. Novelty (Article 33(2) PCT)**

It appears that the subject-matter of present **claims 1 - 35** lacks novelty in view of **D1**.

**4. Inventive Step (Article 33(3) PCT)**

Since it appears that the subject-matter of the present claims lacks novelty, an inventive step can not be acknowledged, too.

**5. Industrial applicability (Article 33(4) PCT)**

The claimed process is suitable to adjust the properties of propylene polymers. Since propylene polymers having special properties are very important industrial products, industrial applicability can be acknowledged.

**Re Item VII**

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document WO 95/21203 is not mentioned in the description, nor is this document identified therein.

**Re Item VIII**

**Certain observations on the international application**

1. The application does not meet the requirements of Article 6 PCT because it is not clear.

Although claims 1, 10 and 31 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

The applicant is requested to file one independent process claim in accordance with Rule 6.3 PCT, containing all essential technical features.

Preferred embodiments of the claimed process can be described in dependent claims.

2. The application does not meet the requirements of Article 6 PCT, because **claim 1** is not clear.

The wording "comprising a catalyst component and an external donor, wherein the external donor is changed" is not clear from the claim.

It appears from the context that the first external donor is exchanged for a second external donor.

This, however, is not clear from the claim.

3. The application does not meet the requirements of Article 6 PCT, because **claim 2** is not clear.

The relative term "strongly coordinating" used in claim 2 has no well-recognised meaning and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claims unclear.

4. The application does not meet the requirements of Article 6 PCT, because **claims 1, 3, 8, 10, 16, 26 and 32** are not clear.

The expressions "preferably", "optionally" and "in particular" render the scope of the claims unclear.

The preferred technical features have to be made subject-matter of further dependent claims.

5. The application does not meet the requirements of Article 6 PCT, because **claims 4 and 13** are not clear.

It appears from the context of the present application that a first external donor is exchanged for a second. Present claims 4 and 13 try to define the electron donor but do not specify which of the two electron donors, the first, the second or both is meant.

6. The application does not meet the requirements of Article 6 PCT, because **claims 7 and 11** are not clear.

Subject-matter of dependent claims 7 and 11 is a process comprising forming a liquid-liquid emulsion system and solidifying the dispersed droplets.

The subject of claims 7 and 11 as a whole is so unclear that there is no hint to the skilled reader, which kinds of liquids have to be chosen and in which amounts. Moreover it is not clear what is meant by "solidifying" in this context.

7. The application does not meet the requirements of Article 6 PCT, because

**claims 9 and 10** are not clear.

The relative terms "essentially" and "essentially constant" used in claims 9 and 10 have no well-recognised meaning and leave the reader in doubt as to the meaning of the technical feature to which they refer, thereby rendering the definition of the subject matter of said claim unclear.

8. The application does not meet the requirements of Article 6 PCT, because **claim 15** is not clear.

The expression "predetermined size range" is unclear since no size range has been defined.

9. The application does not meet the requirements of Article 6 PCT, because **claim 23** is not clear.

Claim 23 relates to a process wherein said emulsion is composed of a dispersed phase which is  $\text{TiCl}_4$ /toluene insoluble oil, having a Group 4 metal/Mg mol ratio..."

It is assumed that said Group 4 metal is said  $\text{TiCl}_4$ .

Therefore, "Group 4 metal" has to be replaced by Titanium.

Moreover, it can not be understood from the claim what kind of oil could be meant by "toluene insoluble oil".